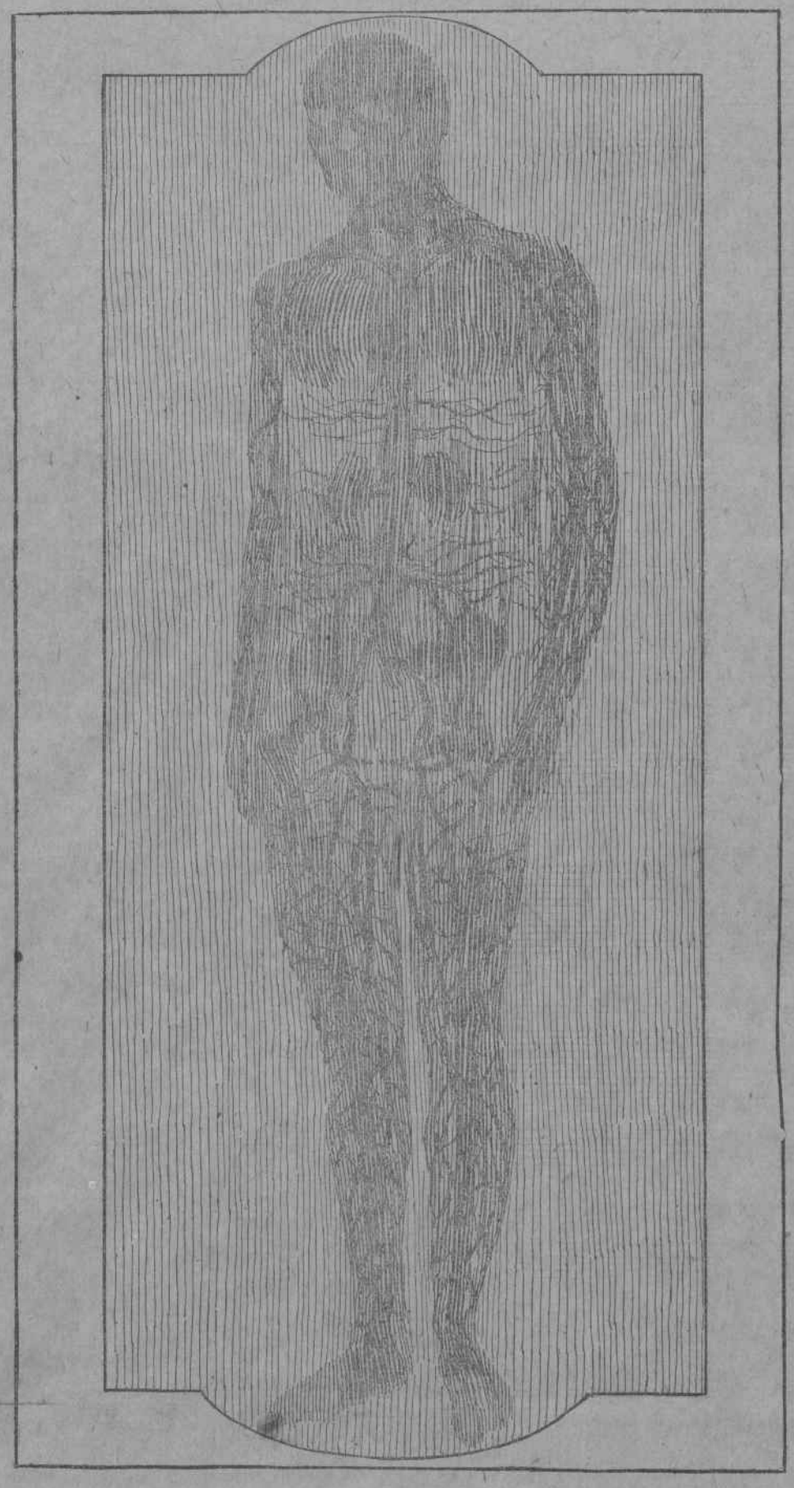
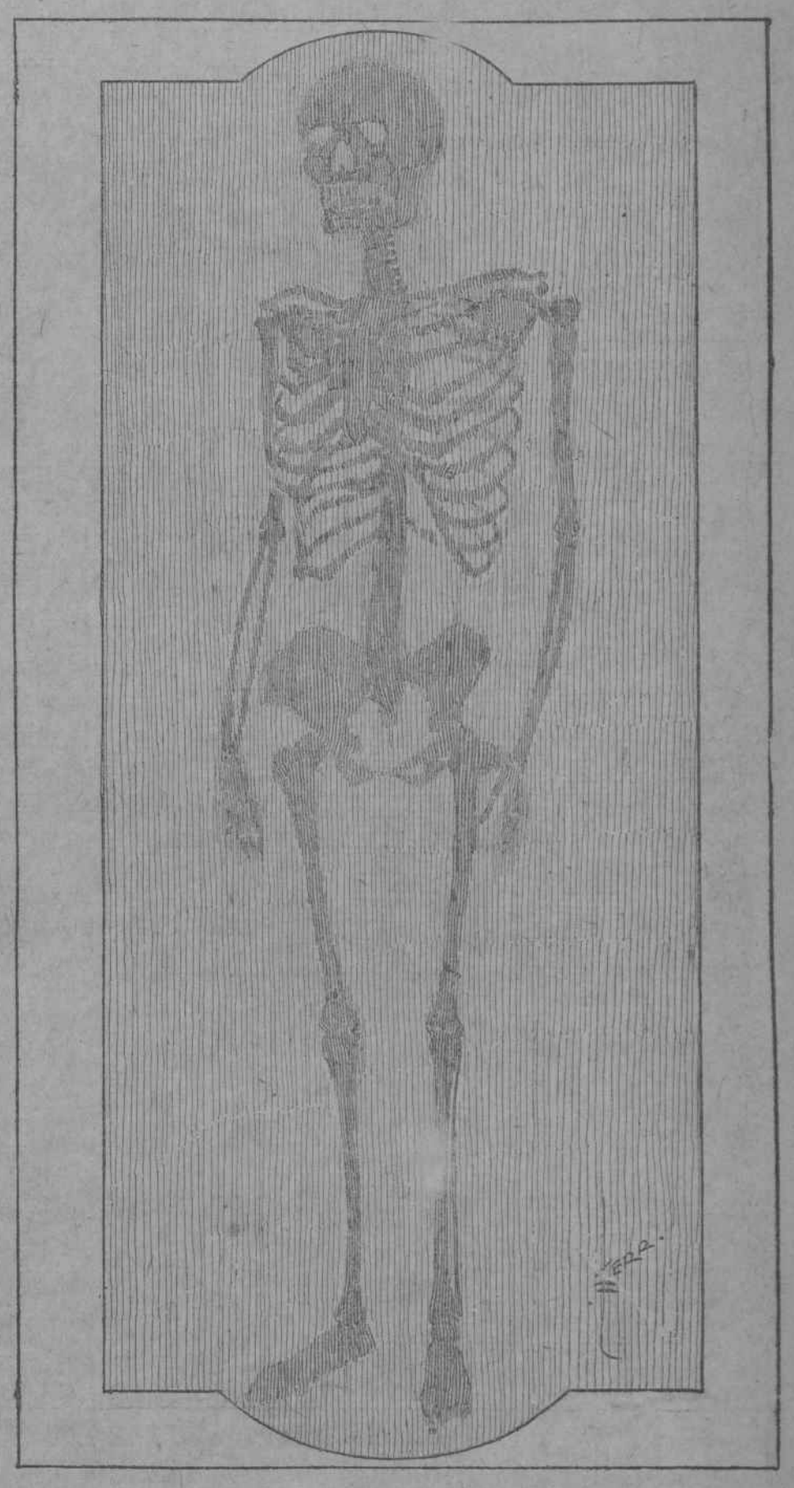
SUNDAY, MARCH 22, 1896.—44 PAGES.

EIGHT FEET FROM THE LIGHT.

SIX FEET FROM THE LIGHT.



FOUR FEET FROM THE LIGHT.



EDISON'S GREATEST TRIUMPH.

The Tireless Inventor at Last Succeeds in Looking Into the Human Heart and Lungs With the Naked Eye.

PHYSICIANS MAY NOW SEE THE INTERNAL ORGANS OF THE BODY AS CLEARLY AS A DENTIST SEES A TOOTH.

Mr. Edison last Friday succeeded in penetrating the human body with the naked eye. He looked into the heart and lungs, and examined the arteries, the blood vessels and muscles of one of his assistants.

Mr. Edison has, perhaps, reached the crowning glory of his life—he has opened the door which at once revolutionizes and incalculably widens the horizon of the medical world.

The great inventor has fulfilled the promise made to the world through the Sunday Journal one week ago—he has laid bare to the eye of the physician and the surgeon, every organ and tissue and bone of the human body. The simplest mind can grasp what this means in the diagnosis, the treatment and the actual observation of the progress of internal disases.

It is very simple to Mr. Edison. With the powerful cathode light behind his patient he gazes through a screen of prepared chemicals and sees every organ of the body as plainly as he sees the dishes on his dinner table.

If his subject stands very close to the light, nothing whatever is seen—the light goes through bones and everything, just as sunlight goes through glass.

If the patient stands a foot or two away from the light the entire skeleton stands revealed.

A step further from the light, and the muscles, tissues and organs of the body appear as plainly as if there was no outside covering of flesh.

And so on—as the distance from the light and the focus is changed. Mr. Edison is now completing a fluorescent screen eight feet high, which will enable him to see all this from the top of your head to the soles of your feet.

Through the Journal last Sunday Mr. Edison told how he could, with proper arrangement, see through a solid block of wood eight inches thick. It was a mere flimsh shadow at that time that could be seen. Now an eight-inch block of wood offers no more impediment than a lace veil. Last week Mr. Edison was experimenting to find a fluorescent stream.

"When I find that in its most perfect form I shall see anything I want to see as soon as the light tubes are perfected."

The screen has been found, and Mr. Edison has made good his promise.

"Here," he said, pointing to a great, box-like structure the size of a door, "that is my screen. I will have a man step in front of that, put four or five Crookes tubes behind him, and you or I or a surgeon will look through him as clean and as clear as though he were made of gauze."

"Head and all?"

"Yes, sir; head and all. We can look through his eyes into his skull, and see everything that is to be seen there. A physician may diagnose his case in an instant. He will simply put his man before the screen, and then penetrate him through from head to foot."

The fluorescent substance used by Mr. Edison, and declared by him to be the most perfect thing of the kind discovered so far, is tungstate of calcium; in other words, tungstate and lime. The two substances are fused in a furnace, and at a proper degree of heat form little crystals, perhaps one-eighth the size of a French pea. These crystals are glued to a piece of paper by means of collodium, a transparent celluloid paint. In the case of the huge screen that Mr. Edison is building for taking at a glance the entire internal organization of a man, the crystals would be spread directly on an inch plank.

A MILL HOPPER SCREEN.

The screen is made in the shape of a monster mill hopper, standing on end. The face on which the crystals are applied will be about eight feet high and four feet broad. To this face will be fastened sides that will slant inward to a sharp point. At this point there will be left a slit just large enough to see through with ease. This slit will be protected by means of a rubber flap in such a way as to exclude all light when the eye is applied to it. The screen will be set up so that the side on which the tungstate of calcium has been glued faces a row of four or five Crookes tubes, set one above the other at an equal distance. The person to be examined will then step in between the screen and the light, and he will be instantly penetrated and become visible to the eyes of the examiner at the screen. Every defect, every organ, will be laid bare to the physician or other person who is making the examination. It will not be necessary to go to the trouble of disrobing, as the clothing worn will be penetrated as if it were the flimsiest mosquito netting.

"But if you penetrate the bones of the skull will there be anything left at all to see?" I asked. "Wont a man dissolve into thin air and leave no impression?"

"We now have perfected our screen to such an extent," he replied, "that we can go through bone when we get the proper light about as well as we can go through some other substances. Of course, under these circumstances, when we get our current and lamps just right, we will be able to look through a man, leaving nothing to be seen, unless, indeed, there are foreign substances, like metals, which do not absorb the rays. When we are looking for such foreign substances we will use the full power and leave only a vague shadow outline of the bones. But in ordinary cases, where we don't want as much strength as that, we'll see just as much or just as little as we desire by changing our focus.

A RAY OF WONDROUS POWER.

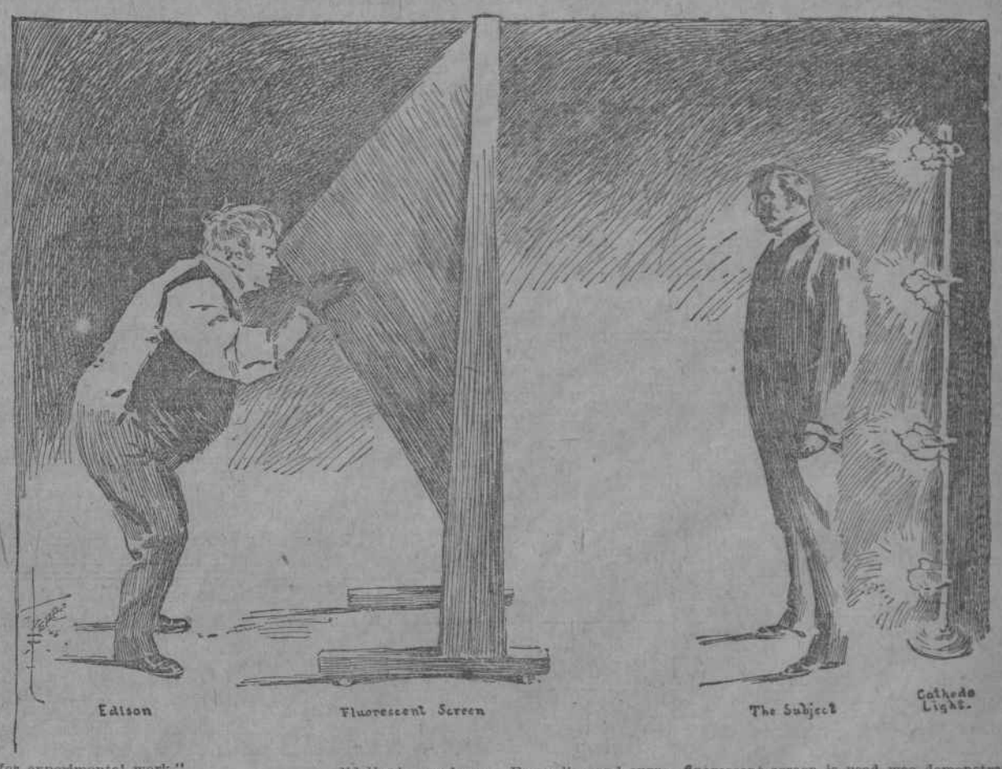
"At three feet from the row of Crooke's tubes, let us say, the rays are so powerful that they will penetrate everything and show nothing on the screen except a vague shadow. Then at four feet, matters become more distinct, the rays are not so powerful and show an outline of the bone. At five feet we see the bones distinctly; they are no longer penetrated. At six feet we see the bones and the internal organs of the body. And so we proceed until we get the proper focus. If it is desired to cut off the entire body, except a certain portion which we desire especially to examine, nothing is easier. We put up a shutter, just as we do in a camera, and shut off everything that is not to come under observation."

Mr. Edison had run out for a few moments from the dark room, in which he was experimenting, and was searching after a new chemical that was to be used in the test. He got what he wanted, and, after watching the X rays come up and die down and come up again in the Crooke's tubes that were on the pumps for exhaustion, he said:

"Now, there you are. Turn on the current, Brown," to his assistant. "That looks perfect, doesn't it? As far as we can see, we have there the X rays, the same condition that exists when we get out our best results. That's what is confusing; for when you take this screen and look through it everything is pitch dark, perfectly black. Try it yourself."

The wizard handed me the screen, which is a miniature of the big screen which he proposes to use for his life-size examination. It looked not unlike the hopper of a small cider mill.

"That," explained Mr. Edison, as he passed the screen along, "is the most familiar form in which to get up the screen for experimental work."



What would have been the open end of the hopper in a cider mill was covered with glazed pasteboard, such as is used in the manufacture of document boxes, letter files, &c. This pasteboard face was six inches square. On the inside it was covered with the tungstate crystals. Where the sloping sides of the hopper-like screen met, a slit about five inches long and an inch wide was left for the eyes. Looking through this slit everything was pitch dark inside. Not a gleam of light was visible.

"Now we'll go in here in this other room, where we have got a tube that is fairly good, but only fairly, and you shall see the difference." The tube in question was mounted and connected to the powerful currrent that was on tap. In a few seconds a purplish blue light became visible. It gradually changed to a pale yellow.

"Try the screen now," said Mr. Edison.

Instead of the black darkness there was a brilliant white patch of light. It was intense, without, however, being at all blinding. It was rather cold and lifeless, having very much the same effect that moonlight might have if it were intensified fifty fold.

"Put your hand to the face of the screen. Do you see anything?"

What I saw almost made me jump back. There was every bone in my hand, as clear and distinct and clean-cut as if there had never been any flesh on it. At first it seemed rather horrible, this skeleton hand. But the sensation of horror soon quieted down, and there was an intense fascination in thus being able to see the bones. The knuckle joints showed as plainly as did the longer bones. Every line and curve could be easily traced. Between the bones of the hand were wide spaces, such as are seen in the hands of skeletons in museums. Nothing was left of the tissue. In my absorption of this startling, novel spectacle, I forgot everything else, until I heard Mr. Edison say: "Now try your wrist. Don't bother about moving your coat sleeve or taking off your cuffs. They form no impediment."

The screen was shifted to the wrist over the coat and cuff and shirt and everything else. The bones stood out as distinctly as they had on the naked hand.

A MARVEL OF PENETRATION.

Up and up the screen was shifted, reaching the elbow and then the shoulder, and still the wonderful rays went through everything, just as if there had been no clothing or flesh there.

"What a pity," remarked the Wizard, while I was still speechless at all this manifestation, "that we haven't got a really good tube, such, for instance, as we had last night. If we had, you could see things that would certainly startle you. Imperfect as our apparatus still is, we had no trouble in seeing through thin sheets of metal, and when we get our rays strong enough, it will be no trick at all to see through four or five inches of iron."

"What seems to be the trouble? Why can't the force be increased with the tubes as you have them?"

"Because we cannot hold the vacuum when we put on the amount of force that I want."

To what slight extent solid substances affect the passage of the X rays when the fluorescent screen is used was demonstrated by holding, first a magazine, and then a two-inch plank, between the face of the screen and my hand. I first placed my hand alone. Then I slipped the magazine in and the hand still stood as clear and distinct. Apparently the magazine, which was certainly over half an inch thick, offered no more obstruction than if it had been so much cobweb. Next I tried the two-inch plank. Through this, too, the X rays went as easily and clearly and brightly as they had through the magazine, and the outline of the bones of the hand remained perfectly clear.

"What I want," he says, "is this: A man comes to a surgeon with a bullet in his arm; the surgeon takes his X ray lamp and his fluorescent screen then and there and locates the bullet. He looks through the arm, through the bone, if necessary, and sees just where it is. We've got that far, already. Now, why should he want to photograph that; simply a useless waste of time. Again, a man comes with a broken arm; a screen is fitted to the surgeon's eyes, the X ray lamp is turned on and he can work with his eyes open, so to speak, for he can see the fracture. He can see how to set the bones; see exactly whether they join or not; see just as clearly as the cabinetmaker who glues together two pieces of wood. What would be the use of photography in that case? I am done with the photographic end of it entirely. As for the other end—well, perhaps we may show you something before long that may be legitimately considered surprising."